

NON-PUBLIC?: N
ACCESSION #: 9209300020
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Calvert Cliffs, Unit 2 PAGE: 1 OF 6

DOCKET NUMBER: 05000318

TITLE: Reactor Trip on RPS when MSIV Shut Due to Hydraulic System
Malfunction

EVENT DATE: 08/17/92 LER #: 92-006-00 REPORT DATE: 09/23/92

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: John Volkoff, Compliance Engineer TELEPHONE: (410) 260-3649

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On August 17, 1992, the Unit 2 reactor tripped due to an automatic actuation of the Reactor Protection System (RPS). An RPS Asymmetric Steam Generator Trip signal was generated when Main Steam Isolation Valve (MSIV) 22 inadvertently travelled shut to less than 90 percent open during performance of Surveillance Test Procedure O-47B-02, Partial Stroke Test of MSIVs. At the time, Unit 2 was at 100 percent power (MODE 1).

The most likely cause of the event was an MSIV hydraulic problem or mechanical binding. There were no significant safety consequences as a result of this event. Corrective actions already taken include appropriate actions for the plant trip, changing out the MSIV hydraulic fluid and replacing the hydraulic fluid sample valve. Corrective actions which will be taken include replacing MSIV 21 and 22 dump valve solenoids, performing an evaluation of higher grade hydraulic fluid,

instituting a situational preventive maintenance procedure for changing out the hydraulic fluid, and a review and revision if necessary of the procedures for preventive maintenance deferrals.

END OF ABSTRACT

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I. DESCRIPTION OF EVENT

On August 17, 1992, the Unit 2 reactor tripped due to an automatic actuation of the Reactor Protection System (RPS). An RPS Asymmetric Steam Generator Trip (ASGT) signal was generated when Main Steam Isolation Valve (MSIV) 22 inadvertently travelled shut to less than 90 percent open during performance of Surveillance Test Procedure (STP) O-47B-02, Partial Stroke Test of MSIVs. At the time, Unit 2 was at 100 percent power (MODE 1).

STP O-47B-02 was scheduled to be performed on the evening of August 17, 1992, on both Unit 2 MSIVs, 21 and 22. The hydraulic system for opening and closing the MSIVs is arranged as shown in Attachment 1. Hydraulic pressure is maintained by an air driven hydraulic pump cycling on and off as necessary. The hydraulic pressure in the system is used to open and keep open the MSIVs. When the pressure is relieved, the MSIVs shut. There are two parallel hydraulic relief paths, channel A and channel B, that lead to a common reservoir. Each path contains a main dump valve and an exercise piston containing an orifice in series. The valve and exercise piston are controlled by solenoids that port hydraulic fluid in the appropriate direction. In MODE 1, the dump valve is normally shut. The exercise piston contains an orifice to slow the rate of hydraulic fluid flow through the line. In MODE 1, the exercise piston is normally retracted. The exercise piston is only extended when performing the partial stroke test. When the dump valve is open, there is a relief path to the reservoir and the MSIV shuts. When the exercise piston is extended, the orifice slows the rate of hydraulic fluid flow and thus slows the rate at which the MSIV shuts when the dump valve is opened.

The MSIVs are partially stroked monthly in accordance with ASME Section XI requirements using STPs O-47A-02 and O-47B-02. STP O-47A-02 tests channel A and STP O-47B-02 tests channel B every month. During the test, by positioning a single test switch, an operator inserts the exercise piston and opens the dump valve in one hydraulic line of one MSIV, and isolates air to the hydraulic pump. The MSIV then begins to slowly shut.

When the operator sees a 10 percent shut light come on, he releases he

switch, which first shuts the dump valve, then retracts the exercise piston and unisolates air to the hydraulic pump. This prevents the MSIV from stroking at normal speed, which could cause the MSIV to fully shut. The MSIV opens completely again as hydraulic pressure rises. If the operator does not release the switch, a limit switch will automatically shut the dump valve, preventing the MSIV from traveling past the 10 percent shut position.

STP O-47B-02 was completed satisfactorily on MSIV 21. All indications were properly monitored, documented and in specification prior to performing the STP on MSIV 22. The STP was started, expected indications were observed, and when the 10 percent shut light came on, the operator released the switch to shut the dump valve and reopen MSIV 22. Operators at all stations then observed

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unexpected indications, indicating that MSIV 22 was rapidly shutting. As the Reactor Operator was going to recommend a manual reactor trip, Unit 2 tripped on ASGT. The ASGT of the RPS trips the Unit if the difference in steam pressure between the two steam generators is greater than 135 psid.

Appropriate actions for a reactor trip were taken. MSIV 22 did not go fully shut.

Subsequent electrical troubleshooting and testing found no problems in the system circuitry. MSIV 22 was fully stroked twice and the partial stroke test was re-performed several times with no problems identified. The event condition could not be repeated and no system problems were found. External visual inspection of MSIV 22 identified no problems. Oil samples did not indicate a substantial deteriorating trend in fluid quality, but did show elevated contamination from particles in the 0-50 micron range.

II. CAUSE OF EVENT

The immediate cause of this event was that the MSIV 22 dump valve did not shut before the exercise piston was retracted. With the exercise piston removed, MSIV 22 started to shut at a faster speed. Before the valve completely shut, the dump valve shut and MSIV 22 stopped shutting. MSIV 22 stroked correctly during follow-up testing.

This event was most likely caused by a hydraulic problem or mechanical binding in the dump valve assembly.

A hydraulic problem could prevent establishment of hydraulic pressure to

shut the MSIV 22 channel B dump valve. Hydraulic fluid samples in December 1991 and subsequent to the trip are inconclusive, however, the post-event samples did indicate increased levels of particulates. Normal monthly samples were not available due to inoperability of the sample valve. The MSIV technical manual recommends changing out the fluid annually, but because this requires the MSIV to be fully shut, the MSIV hydraulic fluid is changed out every refueling cycle during MSIV overhaul. It was last changed out in October, 1990, and exposed to high temperatures starting in May, 1991.

Mechanical binding of the dump valve could have prevented it from operating properly, resulting in the valve not shutting within the required time frame. No specific evidence of such binding was found.

Other potential causes evaluated for the MSIV 22 channel B dump valve not operating properly included possible problems with the dump valve solenoid. The solenoid circuits were tested with no problems identified.

The possibility of the dump valve solenoid poppet O-rings becoming "sticky," preventing the poppet from shifting to establish hydraulic pressure on the main dump valve was

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considered unlikely because the "sticky" characteristic would most likely be present the first time the solenoid repositioned, while the problem occurred the second portion of the cycle.

III. ANALYSIS OF EVENT

This event is reportable under 10 CFR 50.73(a)(2)(iv), a condition that resulted in the automatic actuation of the Reactor Protection System. The reactor tripped as designed for an ASGT, which trips the Unit if the difference in steam pressure between the two steam generators is greater than 135 psid. This protects against events that affect only one of the two steam generators such as loss of load, excess load, loss of feedwater or excess feedwater. The ASGT is part of the Thermal Margin/Low Pressure Trip. All protective systems performed as expected and operators performed their tasks correctly and interpreted indications properly.

This event did not show any evidence that an MSIV would not shut as required to fulfill its safety function, as the dump valve opened when it was tested.

In the event one of the dump valves for MSIV did not open for some reason during an accident scenario, the redundant hydraulic train would be able

to shut the MSIV within the time required.

The transient caused an expected spike of the steam generator water level instrument causing an Auxiliary Feedwater Actuation Signal (AFAS) which actuated and cleared within 0.8 seconds at the time of the trip and started a motor driven auxiliary feed pump. We have experienced post-trip AFAS START signals before at Calvert Cliffs Unit 2. Plant operators understand and anticipate these post-trip AFAS actuations. They are a consequence of the current AFAS design. This problem was previously reported in LER 318/91-004. The Unit 2 AFAS START time-delay modification described in the LER has not been completed due to required design changes. We plan no future AFAS START corrective actions beyond those described in LER 318/91-004. There were no significant safety consequences as a result of this event.

IV. CORRECTIVE ACTIONS

Appropriate actions were taken for the plant trip.

All the hydraulic fluid in the MSIVs 21 and 22 was changed out and the systems were flushed.

The MSIV 22 hydraulic fluid sample valve was replaced.

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Inspection of the valve operator components for evidence of mechanical binding will be conducted as part of the next routine overhaul in the Spring 1993 refueling outage.

The MSIV 21 and 22 dump valve solenoids will be replaced.

An evaluation will be performed for a higher grade hydraulic fluid for the MSIV system for Units 1 and 2.

A situational preventive maintenance procedure will be instituted to change the hydraulic fluid in the MSIV actuator approximately every twelve months as operating conditions permit.

Procedures for PM program deferrals will be reviewed and revised as necessary to ensure those PMs not performed are identified and appropriate action is taken.

V. ADDITIONAL INFORMATION

A. Affected Component Identification

EIIS EIIS
Component Funct Code System Code

Main Steam Isolation Valve ISV SB

B. Previous Similar Events

There have been no previous similar events.

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Figure Attachment 1 "Simplified MSIV Hydraulic Diagram" omitted.

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BALTIMORE
GAS AND
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R. E. DENTON
GENERAL MANAGER
CALVERT CLIFFS September 23, 1992

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 2; Docket No. 50-318; License No. DPR 69
Licensee Event Report 92-006

Gentlemen:

The attached report is being sent to you as required under 10 CFR 50.73 guidelines. Should you have any questions regarding this report, we will be pleased to discuss them with you.

Very truly yours,

RED/JV/bjd
Attachment

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
R. A. Capra, NRC
D. G. McDonald, Jr., NRC
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P. R. Wilson, NRC
R. I. McLean, DNR
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*** END OF DOCUMENT ***
